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(54) **Window shade**

Fenstervorhang

Store de fenêtre

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## Description

[0001] The present invention relates to a window shade according to the preamble of claim 1.

[0002] US-A-4450027 discloses cellular window coverings which may be made of fabric or film materials. A flexible strip of material is folded into a continuous longitudinal tube and the longitudinal folds thus created are permanently set by passing the tube around a heat setting wheel. Adhesive is applied along one side of the flattened tubular material which is subsequently stacked by winding onto a rack having flat surfaces. The winding in this manner presses the adhesive to the next layer wound onto the rack to form a bonded unitary stack of closed tubular cells. When the ends are cut from the rack, the stack may be expanded and the permanently set creases provide a neat and uniform outward appearance.

[0003] US-A-4732630 discloses a modification in which hot melted adhesive is applied to one side of the tubular material. After the flat tubular strips have been stacked and cut, they are placed in an oven under pressure and the hot melted adhesive is activated to bond the layers together.

[0004] Both of the above window coverings have a softer appearance than conventional venetian blinds and good insulating properties. However, they do not have the ability to control the amount of light admitted through the window covering, similar to a traditional venetian blind.

[0005] US-A-3384519 attempts to overcome this and discloses two cloth layers spaced apart by moveable parallel and flexible fabric vanes having each of their marginal edges heat welded to one of the moveable cloth layers. With this window covering, relative movement of the two cloth layers in a direction perpendicular to the vanes changes the angle of the vanes and thus controls the amount of light admitted through the article. Heat welding necessarily requires a melting of at least some of the fibres of the materials bonded, thus providing an uneven outer appearance along the heat welds and producing unwanted crimps or creases in the materials which can result in failure of the fabric fibres. Further, heat welding is a relatively slow process which may require six or more seconds to create a bond over an extended length, which is unacceptable for commercial production. Furthermore, the heat welds are limited in strength and it is difficult to achieve uniformly straight heat-welded joints over an extended length.

[0006] US-A-2865446 discloses a window covering in which a long rectangular piece of fabric is doubled back upon itself and a plurality of accordion-pleated fabric elements are placed between the folded-over sheets. Such a window covering does not provide a uniform appearance because the accordion-pleated fabric located close to the top of the window covering does not expand to the same extent as the fabric closer to the bottom of the window covering. Also, it is very difficult to insure

that such accordion-pleated fabric returns to its desired position after each expansion.

[0007] FR-A-1309194 discloses a curtain with variable opacity. In this curtain, screen or mesh parallel sides are provided with tiltable braids therebetween. The braids are said to be attached at their edges to the sides. However, no means for attachment is specified. The drawings appear to indicate a hinged-type attachment and the specification ends by stating that the difficulties of construction are substantial.

[0008] US-A-4535828 shows a window insulator wherein a sheet of insulating material having encapsulated bubbles is appropriately slit and folded upon itself to form pivotal vanes. The insulating material is of the type commonly used as a stuffer in packaging. The vanes are supported along one edge by the sheet of material from which they are formed and along an opposite edge by flexible strands.

[0009] EP-A-549216 discloses shade comprising a first sheet having an inner face and an outer face, a plurality of elongate substantially planar vanes positioned adjacent to the inner surface of said sheet; and operating means operable directly or indirectly on said vanes to rotate said vanes about the longitudinal axes of the vanes, between a closed position wherein said vanes extend in substantially parallel relationship with said sheet and an open position in which the vanes extend substantially perpendicular to said sheet, said vanes having associated therewith stiffening means, whereby said vanes retain a predetermined form.

[0010] US-A-2577227; 4309472 and 1937342; GB-A-1494842 and 2233895; DE-A-3525515 and FR-A-1465261 show various other structures of this general type.

[0011] It is an object of the present invention to provide an improved form of window shade which is capable of being adjusted to control the passage of light therethrough, is inexpensive to manufacture, and yet still has a pleasing aesthetic effect.

[0012] Starting from the disclosure of DE-A-3525515, the present invention is characterised in that said at least one sheet like element comprises a plurality of bonded strips, one marginal edge of each said strips is bonded to an adjacent one of said strips at an intermediate location thereof adjacent to the hinge of a respective one of said vanes with an opposite marginal edge of each of said strips terminating at one of said front and rear edges of said vanes.

[0013] Because the vanes are substantially rigid and the inner face of the sheet is flexibly attached to the vanes along spaced lines of attachment to marginal areas of the planar faces of the rigid vanes, a structure is provided which is relatively easy to manufacture and yet provides an aesthetically pleasing result. The vanes and/or sheet may be supported by a control system which is operative in pivoting the vanes between an open position wherein they extend substantially perpendicularly to the sheet and a closed position wherein they

extend in a substantially parallel relationship with the sheet so that one can adjust the amount of light that comes through the shade.

[0014] Various different means are contemplated for attaching the vanes flexibly to the sheet. The sheet itself may be attached to the marginal portion of the vanes for this purpose and if desired may be folded back and bonded to itself along the spaced lines of attachment. Alternatively a plurality of elongate strips may be provided to form the sheet and one marginal edge part of each strip may be attached to a marginal area of a vane and the other marginal edge part of the strip may be attached to an adjacent strip near the area of attachment of said adjacent strip to the adjacent vane. In either arrangement the marginal edge part of the strip may be attached to a vane by means of a separate flexible connector.

[0015] The vanes may, if desired, be made of stiffened fabric.

[0016] It is also contemplated that a second sheet may be provided which has its inner face flexibly attached along spaced lines of attachment to marginal areas of the planar faces of the rigid vanes extending longitudinally adjacent the opposite side edges of each vane from those to which the first sheet is attached.

[0017] In order that the present invention may more readily be understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:-

Figure 1 is a fragmentary isometric view of a first embodiment of the window covering of the present invention.

Figure 2 is an enlarged fragmentary section taken along line 2-2 of Figure 1.

Figure 3 is an enlarged fragmentary section taken along line 3-3 of Figure 1;

Figure 4 is a transverse fragmentary section taken through a vane illustrating a first embodiment of the invention;

Figure 5 is an enlarged fragmentary section similar to Figure 4 showing the juncture line between the vane and the sheet;

Figure 6 is a fragmentary transverse section showing two vanes in an open condition fabricated in accordance with Figures 4 and 5;

Figure 7 is a fragmentary section similar to Figure 6 with the vanes in a closed condition;

Figure 8 is an enlarged fragmentary isometric view showing a second embodiment of the present invention;

Figure 9 is an enlarged fragmentary isometric view similar to Figure 8 showing a third embodiment of the present invention;

Figure 10 is a fragmentary transverse section showing the vanes of the arrangement illustrated in Figure 9 in a closed condition; and

Figure 11 is a fragmentary isometric view of the arrangement shown in Figures 9 and 10 with the vanes in a closed condition.

[0018] In Figure 1 the window covering 54 can be seen to include a plurality of vertically extending vanes 56 formed off a rear face 58 of a fabric sheet 60. The vanes 56 are suspended from a head rail 62 containing a control system 64 which may be of the general type described in US patent No. 4,724,883 which is hereby incorporated by reference. The fabric sheet 60 is preferably made of a transparent or translucent material such as sheer.

[0019] The vanes 56 are formed integrally with a virgin sheet of such fabric by vertically gathering the virgin sheet at horizontally spaced locations so as to form a plurality of equally spaced elongated loops 66 of fabric extending off a rear face of the sheet. The term "virgin sheet" is used herein to designate the piece of fabric material from which both the vanes 56 and the fabric sheet 60 itself are formed. The term "fabric sheet" herein designates the sheet like component of the completed window covering.

[0020] The substantially rigidified vanes 56 retain their flat planar form and are connected to vertical pivot shafts 70 at their top end at a location intermediate the front and rear edges 72 and 74 respectively of the vane. The pivot shafts 70 may be connected to the vanes in any suitable manner but preferably the shafts are provided with a notch 76 at their lower end, so as to straddle the top edge of the associated vane and then pinned to the vane. The shafts 70 are suspended from carriers 80 that are slidably positioned within the head rail 62 and moveable transversely of the window covering by a control cord 82. A second control cord 84 rotates the shafts 70 through the carriers 80 so that the vanes can be pivoted about longitudinal vertical axes extending through the shafts 70 between an open position wherein they extend substantially perpendicularly to the sheet 60 as illustrated in Figure 2 and a closed position wherein they lie in substantially parallel relationship with the sheet.

[0021] As illustrated in Figure 4 to 7, the fabric sheet 60, in these figures referred to by the reference 94, is formed from integrated or bonded strips 96 of the same fabric material with the strips extending vertically and being interconnected to establish double layered vanes 98 formed from the same fabric. As is best illustrated in Figures 6 and 7, a front face 100 of each strip 96 is connected along one vertically extending edge 102 to the front face of an intermediate location on a next adjacent

strip with a bonding medium 103 and its opposite vertically extending edge 104 is folded upon itself so as to form a loop 106, the layers of which are integrated with the stiffening compound 68. The vertically extending adjacent edges 102 and 104 of adjacent strips 96 are spaced slightly to define a single layer juncture line or living hinge 108 between the vanes 98 and the sheet 94. The single layer juncture line of course is more readily flexed than a double layer. Figure 5 shows an enlarged section of the juncture between adjacent strips 96 illustrating the regions in which the stiffening compound 68 is applied and the single layer juncture line 108 between the vanes and the sheet where no stiffening compound is used.

[0022] Figure 8 shows a further arrangement 110 of the present invention with this arrangement being very similar to that shown in Figures 4 to 7 but wherein a crease 111 is formed in the single layer of vanes 112 along a juncture line 113 so as to render the juncture line even more flexible. The crease can be made by compressing the fabric material or in the case of synthetics, the material can be heat creased along the juncture line.

[0023] Figure 9 shows another embodiment 114 of the present invention with this arrangement being very similar to that shown in Figures 4 to 7 but wherein a plurality of spaced elongated slots 115 are provided along a juncture line 116 between a vane 117 and an attached sheet 118 as illustrated in Figures 4 to 7. The slots again render the juncture line more flexible than the arrangements shown in Figures 4 to 7.

[0024] Figures 10 and 11 are sectional and isometric views respectively of the arrangement shown in Figure 9 showing the relationship of the vanes 117 to the integrated strips of sheet material.

[0025] Various modifications as illustrated in the published application EP-A-0654577 may, where appropriate, be incorporated in the present invention, such as the provision of a stiffening slat between the layers of the vanes and the provision of a further sheet like element attached to the rear edges of the vanes.

## Claims

1. A shade comprising at least one sheet like element (60,94,118) having an inner face and outer face; a plurality of elongate substantially planar vanes (56,98,106,112,117) having opposite longitudinal front and rear edges (72,74), said vanes each being hingedly connected at their front edge (72) to the inner face of said at least one sheet like element in spaced parallel relationship, thereby defining a hinge (108,113,116) and operating means (64,70) operable to rotate said vanes about longitudinal axes of the vanes, between a closed position in which said vanes extend substantially parallel to said at least one sheet like element and an open position in which the vanes extend substantially perpendicular to said at least one sheet like element, said vanes being formed as integral extensions of said at least one sheet like element, and said vanes having associated therewith a stiffening means, whereby said vanes retain a predetermined form, characterised in that said at least one sheet like element (60,94,118) comprises a plurality of bonded strips (96), one marginal edge (102) of each said strips is bonded to an adjacent one of said strips at an intermediate location thereof adjacent to the hinge (108,113,116) of a respective one of said vanes (56,98,106,112,117) with an opposite marginal edge (104) of each of said strips terminating at one of said front and rear edges (72,74) of said vanes.
2. A shade according to claim 1, characterised in that a portion of each of said strips (96) forming each of said vanes is folded back on itself to form said at least two layers of material.
3. A shade according to claim 3, characterised in that the opposite marginal edge (104) of each of said strips (96) is attached to itself at the front edge (72) of the vane formed therefrom and in that adjacent marginal edges (102,104) of adjacent strips are spaced from one another to define a single layer of material at the hinge (108,113,116).
4. A shade according to any one of claims 1 to 3, characterised in that said vanes (56,98,106,112,117) are of fabric material.
5. A shade according to claim 4, characterised in that said stiffening means include a stiffening compound impregnated into the fabric material of said vanes.
6. A shade according to any one of claims 1 to 5, characterised in that said vanes are compressed along said hinge (108,113,116) to form an area that is more flexible than the remainder of said vanes.
7. A shade according to any one of claims 1 to 5, characterised in that said vanes are apertured (111,115) adjacent to and between said marginal edges (102,104) to form an area that is more flexible than the remainder of said vanes.
8. A shade according to any one of claims 1 to 7, characterised in that said at least one sheet like element (60,94,118) is translucent and each of said vanes (56,98,106,112,117) is opaque.
9. A shade according to any one of claims 1 to 8, characterised in that said vanes extend vertically.
10. A shade according to any one of claims 1 to 8, characterised in that said vanes extend horizontally.

11. A shade according to any preceding claim, characterised in that a further sheet like element is flexibly attached to the rear edges (74) of said vanes opposite of said at least one sheet like element.

#### Patentansprüche

1. Fenstervorhang umfassend mindestens ein bahnartiges Element (60,94,118) mit einer Innenseite und einer Außenseite; eine Vielzahl von länglichen, im wesentlichen planaren Lamellen (56,98,106,112,117) mit einander gegenüberliegenden in Längsrichtung verlaufenden vorderen und hinteren Kanten (72,74), wobei diese Lamellen parallel zueinander in gewissen Abständen angeordnet sind und jeweils an ihrer vorderen Kante (72) gelenkartig mit der Innenseite des genannten mindestens einen bahnartigen Elements verbunden sind, so daß ein Gelenk (108,113,116) definiert wird; und eine Betätigungsvorrichtung (64,70), die so betätigt werden kann, daß sie die genannten Lamellen um die Längsachse der Lamellen zwischen einer geschlossenen Position, in der die genannten Lamellen im wesentlichen parallel zu dem genannten mindestens einen bahnartigen Element angeordnet sind, und einer geöffneten Position, in der die Lamellen im wesentlichen rechtwinklig zu dem genannten mindestens einen bahnartigen Element angeordnet sind, wobei die genannten Lamellen als integral ausgeführte Verlängerungen des genannten mindestens einen bahnartigen Elements gebildet werden und die genannten Lamellen mit einem Versteifungsmittel verbunden sind, wodurch die genannten Lamellen eine festgelegte Form behalten, **dadurch gekennzeichnet**, daß das genannte mindestens eine bahnartige Element (60,94,118) eine Vielzahl von verbundenen Streifen (96) umfaßt, wobei jeweils ein Rand (102) jedes derartigen Streifens mit einem benachbarten derartigen Streifen verbunden ist, und zwar an einer Stelle im mittleren Bereich des benachbarten Streifens neben dem Gelenk (108,113,116) einer der genannten Lamellen (56, 98, 106, 112, 117), und wobei ein gegenüberliegender Rand (104) jedes derartigen Streifens an einer der genannten vorderen und hinteren Kanten (72,74) der genannten Lamellen endet.
2. Fenstervorhang nach Anspruch 1, **dadurch gekennzeichnet**, daß ein Teil jedes derartigen Streifens (96), aus denen jede der genannten Lamellen gebildet wird, umgefaltet wird, so daß sich mindestens zwei Materiallagen ergeben.
3. Fenstervorhang nach Anspruch 2, **dadurch gekennzeichnet**, daß der gegenüberliegende Rand (104) jedes derartigen Streifens (96) an der vorderen Kante (72) der daraus gebildeten Lamelle an sich selbst befestigt ist und daß benachbarte Ränder (102,104) benachbarter Streifen in einem gewissen Abstand voneinander angeordnet sind, so daß sich am Gelenk (108,113,116) eine einzige Materiallage ergibt.

4. Fenstervorhang nach Ansprüchen 1 bis 3, **dadurch gekennzeichnet**, daß die genannten Lamellen (56,98,106, 112,117) aus Gewebematerial bestehen.
5. Fenstervorhang nach Anspruch 4, **dadurch gekennzeichnet**, daß das genannte Versteifungsmittel eine Versteifungsmischung umfaßt, die das Gewebematerial der genannten Lamellen durchdringt.
6. Fenstervorhang nach Ansprüchen 1 bis 5, **dadurch gekennzeichnet**, daß die genannten Lamellen entlang des genannten Gelenks (108,113,116) zusammengepreßt werden, so daß sie in diesem Bereich flexibler sind als der übrige Teil der genannten Lamellen.
7. Fenstervorhang nach Ansprüchen 1 bis 5, **dadurch gekennzeichnet**, daß die genannten Lamellen mit Öffnungen (111,115) neben und zwischen den genannten Rändern (102,104) versehen sind, so daß sie in diesem Bereich flexibler sind als der übrige Teil der genannten Lamellen.
8. Fenstervorhang nach Ansprüchen 1 bis 7, **dadurch gekennzeichnet**, daß mindestens ein bahnartiges Element (60,94,118) durchscheinend ist und jede der genannten Lamellen (56,98,106,112,117) lichtundurchlässig ist.
9. Fenstervorhang nach Anspruch 1 bis 8, **dadurch gekennzeichnet**, daß die genannten Lamellen in vertikaler Richtung verlaufen.
10. Fenstervorhang nach Anspruch 1 bis 8, **dadurch gekennzeichnet**, daß die genannten Lamellen in horizontaler Richtung verlaufen.
11. Fenstervorhang nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet**, daß ein weiteres bahnartiges Element flexibel an den hinteren Kanten (74) der genannten Lamellen gegenüber dem genannten mindestens einen bahnartigen Elements befestigt ist.

#### Revendications

1. Store comprenant au moins un élément de type feuille (60, 94, 118) comportant une face interne et une face externe ; une pluralité de lames allongées

sensiblement planes (56, 98, 106, 112, 117) ayant des bords avant et arrière longitudinalement opposés (72, 74), lesdites lames étant chacune raccordées par charnière à leur bord avant (72) à la face interne dudit au moins un élément de type feuille en relation parallèle espacée, définissant de ce fait une charnière (108, 113, 116) et un moyen d'actionnement (64, 70) pouvant être actionné pour faire tourner lesdites lames autour des axes longitudinaux des lames, entre une position fermée, dans laquelle lesdites lames s'étendent sensiblement parallèles audit au moins un élément de type feuille et une position ouverte, dans laquelle les lames s'étendent sensiblement perpendiculaires audit au moins un élément de type feuille, lesdites lames étant formées comme prolongements solidaires dudit au moins un élément de type feuille, et lesdites lames ayant associé à celle-ci un moyen de rigidification, d'où il résulte que lesdites lames conservent une forme prédéterminée, caractérisé en ce que ledit au moins un élément de type feuille (60, 94, 118) comprend une pluralité de bandes collées (96), un bord marginal (102) de chacune desdites bandes est collé à un bord adjacent desdites bandes à un emplacement intermédiaire de celles-ci adjacent à la charnière (108, 113, 116) d'une lame respective desdites lames (56, 98, 106, 112, 117) avec un bord marginal opposé (104) de chacune desdites bandes se terminant à un bord desdits bords avant et arrière (72, 74) desdites lames.

2. Store selon la revendication 1, caractérisé en ce qu'une partie de chacune desdites bandes (96) formant chacune desdites lames est repliée sur elle-même afin de former lesdites au moins deux couches de matériau. 35
3. Store selon la revendication 3, caractérisé en ce que le bord marginal opposé (104) de chacune desdites bandes (86) est fixé à elle-même au bord avant (72) de la lame formée à partir de celle-ci et en ce que les bords marginaux adjacents (102, 104) des bandes adjacentes sont espacés les uns des autres pour définir une seule couche de matériau au niveau de la charnière (108, 113, 116). 45
4. Store selon l'une quelconque des revendications 1 à 3, caractérisé en ce que lesdites lames (56, 98, 106, 112, 117) sont constituées d'un matériau de tissu. 50
5. Store selon la revendication 4, caractérisé en ce que ledit moyen de rigidification inclut un composé de rigidification imprégné dans le matériau de tissu desdites lames. 55
6. Store selon l'une quelconque des revendications 1 à 5, caractérisé en ce que lesdites lames sont com-

pressées le long de ladite charnière (108, 113, 116) pour former une zone qui est plus souple que le reste desdites lames.

- 5 7. Store selon l'une quelconque des revendications 1 à 5, caractérisé en ce que lesdites lames sont ajoutées (111, 115) adjacentes et entre lesdits bords marginaux (102, 104) de façon à former une zone qui est plus souple que le restant desdites lames.
- 10 8. Store selon l'une quelconque des revendications 1 à 7, caractérisé en ce que ledit au moins un élément de type feuille (60, 94, 118) est translucide et chacune desdites lames (56, 98, 106, 112, 117) est opaque. 15
9. Store selon l'une quelconque des revendications 1 à 8, caractérisé en ce que lesdites lames s'étendent verticalement. 20
10. Store selon l'une quelconque des revendications 1 à 8, caractérisé en ce que lesdites lames s'étendent horizontalement.
- 25 11. Store selon l'une quelconque des revendications précédentes, caractérisé en ce qu'un autre élément de type feuille est fixé de manière souple aux bords arrière (74) desdites lames opposées audit au moins un élément de type feuille. 30







